2008-07

N 536 - Utilization of Nursing Research in Advanced Practice, Summer 2008

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Research Design

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Design Characteristics

- Maximizes control over factors to increase the validity of the findings
- Guides the researcher in planning and implementing a study
Level of Control: Quantitative Research

- Descriptive
- Correlational
- Quasi-experimental
- Experimental

Increased Control with Design
Concepts Relevant to Research Design (1)

Causality

A  \[\rightarrow\]  B  
Pressure  \[\rightarrow\]  Ulcer

Multicausality

Years smoking  \[\rightarrow\]  Heart disease  
High fat diet  \[\rightarrow\]  
Limited exercise  \[\rightarrow\]  

Research Design
Concepts Relevant to Research Design (2)

- Probability: Likelihood of an outcome
- Bias: Slanting findings
- Manipulation: Treatment
- Control: All phases of design
Design Validity

- Measure of accuracy of a study

- Examined with critique of the following dimensions:
  - Statistical conclusion validity
  - Internal validity
  - Construct validity
  - External validity
Elements of a Strong Research Design (1)

- Controlling the environment of the study setting

- Levels of controlling:
  - Natural setting
  - Partially controlled setting: e.g., clinics
  - Highly controlled setting: e.g., laboratory
Elements of a Strong Research Design (2)

- Controlling the equivalence of subjects and groups
  - Random subject selection
  - Random assignment to groups
Elements of a Strong Research Design (3)

- Controlling the treatment
  - Choose a treatment based on research and practice
  - Develop a protocol for implementation
  - Document the implemented treatment
  - Use a check-list to determine the extent of completeness to which the treatment was implemented
  - Evaluate the treatment during the study
Elements of a Strong Research Design (4)

- Controlling measurement
  - Reliability
  - Validity
  - Number of measurement methods
  - Types of instruments
Elements of a Strong Research Design (5)

• Controlling extraneous variables
  - Identify and eliminate extraneous variables via sample criteria, choice of settings, or research design
  - Random sampling
  - Sample: Heterogenous, homogeneous, or matching
  - Statistical control
Problems with Study Designs

- Inappropriate for the study purpose or the research framework
- Poorly developed designs
- The research methods were poorly implemented
- Inadequate treatment, sample, or measurement methods
Selecting a Design

- Is there a treatment?
  - No
  - Yes
  - Is the treatment tightly controlled by the researcher?
    - No
    - Yes
    - Is the primary purpose examination of relationships?
      - No
      - Yes
        - Will the sample be studied as a single group?
          - No
          - Yes
            - Correlational Design
              - No
              - Yes
              - Experimental Study
                - No
                - Yes
Selecting a Descriptive Design

Examine sequences across time?

No

One Group?

No

Comparative Descriptive Design

Yes

Descriptive Design

Data collected across time?

No

Cross-sectional design

Yes

Studying events partitioned across time?

No

Trend Analysis

Yes

Repeated measures of each subject

Yes

Longitudinal Study

No

Case Study

Yes

Single unit of study

Longitudinal design with treatment partitioning

Cross-sectional design with treatment partitioning
A Typical Descriptive Design

Clarification ➔ Measurement ➔ Description ➔ Interpretation

Phenomenon of Interest

Variable 1 ➔ Description of Variable 1

Variable 2 ➔ Description of Variable 2

Variable 3 ➔ Description of Variable 3

Variable 4 ➔ Description of Variable 4

Interpretation of Meaning ➔ Development of Hypotheses
A Comparative Descriptive Design

- Group I: (variables measured)
  - Describe
  - Comparison of Groups on Selected Variables
  - Interpretation of Meaning
  - Development of Hypotheses

- Group II: (variables measured)
  - Describe

Research Design
Selecting the Type of Correlational Design

- **Describe relationships between/among variables?**
  - Descriptive correlational design

- **Predict relationships between/among variables?**
  - Predictive correlational design

- **Test theoretically proposed Relationships?**
  - Model testing design
A Descriptive Correlational Design

Measurement

- Research Variable 1
  - Description of variable
  - Examination of Relationship
  - Interpretation of Meaning

- Research Variable 2
  - Description of variable
  - Development of Hypotheses

Research Design
A Predictive Design

Value of Intercept + Value of Independent Variable 1 + Value of Independent Variable 2 = Predicted Value of Dependent Variable
Selecting The Type of Quasi-Experimental Design

- Control Group?
  - No
    - Pretest?
      - No
        - One-group post-test only design
      - Yes
        - Repeated Measures?
          - No
            - Comparison with population values?
              - Yes
                - Strategy for Comparison
                  - No
                    - Suggest Reevaluating design
                  - Yes
                    - Compare treatment & control conditions?
                      - No
                        - One group pretest/post-test design
                      - Yes

- Yes
  - Pretest?
    - No
      - Repeated Measures?
        - No
          - One group pretest/post-test design
        - Yes
          - Suggest Reevaluating design
          - Compare treatment & control conditions?
Selecting The Type of Experimental Design

- Pretest
  - No: Post-test only control group design
  - Yes: Repeated Measurements?
    - No: Examine effects of confounding variables?
      - No: Multiple sites?
        - No: Pretest/post-test control group design
        - Yes: Randomized clinical trials
      - Yes: Blocking?
        - No: Comparison of multiple levels of treatment
        - Yes: Randomized Block Design
    - Yes: Repeated measures design
      - No: Examination of complex relationships among variables in relation to treatment
      - Yes: Nested Designs
### Pretest-Post Test, Control Group Designs

<table>
<thead>
<tr>
<th></th>
<th>Measurement of dependent variables</th>
<th>Manipulation of independent variables</th>
<th>Measurement of dependent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomly selected experimental group</td>
<td>PRETEST</td>
<td>TREATMENT</td>
<td>POST-TEST</td>
</tr>
<tr>
<td>Randomly selected control group</td>
<td>PRETEST</td>
<td></td>
<td>POST-TEST</td>
</tr>
</tbody>
</table>

**Treatment:** Under control of researcher

**Findings:**
- Comparison of pretest and post-test scores
- Comparison of experimental and control groups
- Comparison of pretest-post-test differences between samples

**Example:** Your self (1990). The impact of group reminiscence counseling on a depressed elderly population.

**Uncontrolled threats to validity:**
- Testing
- Mortality

**Instrumentation**
- Restricted generalizability as control increases
## Post-Test-Only Control Group Design

<table>
<thead>
<tr>
<th>Randomly selected experimental group</th>
<th>Randomly selected control group</th>
<th>Measurement of independent variables</th>
<th>Measurement of dependent variables</th>
<th>TREATMENT</th>
<th>POST-TEST</th>
<th>POST-TEST</th>
</tr>
</thead>
</table>

**Treatment:** Under control of researcher

**Findings:** Comparison of experimental and control groups


**Uncontrolled threats to validity:** Instrumentation, Mortality, Limited generalizability as control increases
### Pain Control Management

<table>
<thead>
<tr>
<th></th>
<th>Primary Nursing Care</th>
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<tbody>
<tr>
<td><strong>Traditional Care</strong></td>
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<tr>
<td>Unit A</td>
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<td>Unit B</td>
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<td>Unit D</td>
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<td><strong>PRN Medication</strong></td>
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<td>Unit E</td>
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<td>Unit H</td>
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*New approach: “Around the clock” medication*
Advantages of Experimental Designs

- More controls in design and conducting a study
- Increased internally validity
  - Decreased threats to design validity
- Fewer rival hypotheses
Advantages of Quasi-Experimental Designs

- More practical
  - Ease of implementation
- More feasible
  - Resources, subjects, time, setting
- More generalizable
  - Comparable to practice
Developing the Design Section of Your Proposal

- Identify the design
  - Name it specifically
- Provide a map of the design
- Discuss your rationale for using this design
- Describe threats to the validity of the chosen design